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 - 10. Sampling Point Requirements
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 - 3. Mixed Paint Properties
 - 4. Color
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 - 1. Vehicle Component
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 - (e) High Strength Bolts, Nuts, and Washers
 - 1. General Use
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 - a. Bolts
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 - 2. Fabrication
 - 3. Protective coating
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 - 2. Stretcher Bars, Truss Rods, and Turnbuckles
 - 3. Braces
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 - (c) Aluminum Fabric Chain Link Fence
 - (d) Gates
 - 1. Steel Gates
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 - (e) Control Procedures for Furnishing Fence and Accessories
 - 1. General Requirements
 - 2. Suppliers of Pretested Approved Stockpiled Material
 - 3. Suppliers Not Furnishing Pretested Approved Stockpiling Material
- 910.19 Overhead Sign Structures
 - (a) Aluminum Overhead Sign Structures, Box Truss and Bridge Attached
 - (b) Steel Overhead Sign Structures, Box Truss, Cantilever, Monotube, and Bridge Attached

- 910.20 Blank
- 910.21 Steel Sheet Piling
- 911 -- WOOD MATERIALS
- 911.01 Untreated Lumber
 - (a) General
 - 1. Boards
 - 2. Dimension Lumber
 - 3. Structural Lumber
 - 4. Timbers
 - 5. Timbers, Round
 - 6. Yard Lumber
 - 7. Surfaced or Dressed Lumber
 - 8. Rough Lumber
 - (b) Species and Grade
 - (c) Inspection
 - (d) Tolerances
 - (e) Untreated Piling
- 911.02 Treated Lumber
 - (a) General
 - (b) Bridge Lumber
 - (c) Piling
 - (d) Guardrail Posts, Braces, and Battens
 - (e) Sign Posts
 - (f) Sawed Timber Posts and Blocks for Thrie-Beam and W-Beam Guardrail
 - 1. Species and Grades
 - 2. Department Grade GRP
 - a. Splits
 - b. Checks
 - c. Shakes
 - d. Stains
 - e. Slope of Grain
 - f. Wane
 - g. Knots
 - 3. Department Grade GRB
 - a. Splits
 - b. Checks
 - c. Shakes
 - d. Stains
 - e. Wane
 - f. Knots
 - 4. General Requirements
 - a. Decay
 - b. Unsound Wood
 - c. Crook or Bow
 - d. Dimensional Tolerances
 - 5. Pressure Treating Posts and Blocks
 - a. Machining
 - b. Blank
 - c. Inspection Before Treatment
 - d. Test for Moisture Content
 - e. Preservative Treatment
 - f. Material for Preservative Treatments
 - g. Treatment Methods
 - h. Sorting and Spacing
 - i. Conditioning
 - j. Treatment

Section Title

- k. Inspection During Treatment
- 1. Retentions
- m. Penetration
- n. Inspection After Treatment
- o. Branding
- p. Conformance
- q. Records
- r. Independent Inspections
- 6. Field Treatment of Posts and Blocks
- 7. Rejection for Degrade After Treatment
- (g) Preservatives
 - 1. Waterborne Preservatives

912 -- CONCRETE CURING MATERIALS AND ADMIXTURES

- 912.01 Curing Materials
 - (a) Burlap Cloth made from Jute or Kenaf
 - (b) Waterproof Paper Blankets
 - (c) White Polyethylene Sheeting, Film
 - (d) White Burlap Polyethylene Sheet
 - (e) Liquid Membrane Forming Compounds
- 912.02 Curing-Sealing Materials
- 912.03 Admixtures for Use in Concrete
 - (a) Air Entraining Admixtures
 - (b) Chemical Admixtures for Concrete
 - 1. Type A
 - 2. Type B
 - 3. Type C
 - 4. Type D
 - 5. Type E
 - 6. Type F
 - 7. Type G
 - 8. High Range Water Reducing and High Range Water Reducing and Retarding Admixture Systems
 - (c) Certification
 - (d) Approved Admixtures
 - (e) Performance of Admixtures
- 912.04 Latex Modifiers
- 912.05 Mineral Admixtures
- 913 -- MISCELLANEOUS
- 913.01 Water
- 913.02 Calcium Chloride
- 913.03 Sodium Chloride
- 913.04 Hydrated Lime
- 913.05 Precast Concrete Curbing
- 913.06 Precast Concrete Units Not Otherwise Covered
- 913.07 Flexible Delineator Posts
- 913.08 Delineators
 - (a) Acrylic Plastic Delineators
 - (b) Reflective Sheeting Delineators
 - (c) Barrier Delineators
- 913.09 Glass Beads
- 913.10 Traffic Signs
 - (a) Sheet Signs
 - (b) Panel Signs
 - (c) Flexible Roll-Up Prismatic Reflective Sign
 - 1. Reflectivity
 - 2. Color

- 3. Sheeting
- 4. Durability
- 5. Impact Resistance
- 6. Sign Face Backing Fabric
- 7. Cross Brace Assembly and Attaching Fasteners
- 8. General Characteristics and Packaging
- 9. Basis of Use
- (d) Reflective Sheeting
 - 1. General
 - a. Reflectivity
 - b. Color
 - c. Adhesive
 - d. Sheeting
 - e. Durability
 - f. Impact Resistance
 - g. General Characteristics and Packaging
 - 2. Enclosed Lens, Engineer Grade, and Super Engineer Grade, Reflective Sheeting
 - a. Reflectivity
 - b. Color
 - c. Adhesive
 - d. Sheeting
 - e. Durability
 - f. Impact Resistance
 - g. General Characteristics and Packaging
 - 3. Encapsulated Lens, High Intensity, Reflective Sheeting
 - a. Reflectivity
 - b. Color
 - c. Adhesive
 - d. Sheeting
 - e. Durability
 - f. Impact Resistance
 - g. General Characteristics and Packaging
 - 4. Flexible Encapsulated Lens Reflective Sheeting, High Intensity
 - a. Reflectivity
 - b. Color
 - c. Adhesive
 - d. Sheeting
 - e. Durability
 - f. Impact Resistance
 - g. General Characteristics and Packaging
 - 5. Prismatic Lens, High Intensity, Reflective Sheeting
 - a. Reflectivity
 - b. Color
 - c. Adhesive
 - d. Sheeting
 - e. Durability
 - f. Impact Resistance
 - g. General Characteristics and Packaging
 - 6. Prismatic Lens, Super High Intensity, Reflective Sheeting
 - a. Reflectivity
 - b. Color
 - c. Adhesive
 - d. Sheeting
 - e. Durability
 - f. Impact Resistance
 - g. General Characteristics and Packaging

- (e) Letters, Numerals, Symbols, and Accessories
 - 1. Embossed Reflective Sheeting Type
 - 2. Acrylic Plastic Type
- (f) Fiberglass Reinforced Plastic Sign Panels
 - 1. Mechanical Properties
 - 2. Physical Properties
 - a. Thickness
 - b. Length and Width
 - (1) Panel Length of 3660 mm (144 in.) or Less
 - (2) Panel Length Exceeding 3660 mm (144 in.)
 - (3) Panel Width of 3660 mm (144 in.) or Less
 - c. Squareness
 - d. Weather Resistance
 - e. Fire Resistance
 - f. Impact Resistance
 - g. Coefficient of Linear Thermal Expansion
 - h. Panel Smoothness
 - i. Flatness
 - (1) Test Purpose
 - (2) Test Procedure
 - j. Color
- (g) Samples and Tests
 - 1. Reflective Sheeting
 - 2. Traffic Signal Materials
- 913.11 Highway Illumination Materials
 - (a) Lighting Standards and Mast Arms, under 80 feet (24.4 m)
 - 1. General Requirements
 - 2. Aluminum Lighting Standards
 - a. Round Seamless
 - b. Single Longitudinal Welded
 - 3. Stainless Steel Lighting Standards
 - 4. Galvanized Steel Lighting Standards
 - 5. Wood Pole Lighting Standards
 - 6. Frangible Breakaway Bases
 - a. Cast Aluminum Transformer Base
 - b. Breakaway Coupling
 - 7. Anchor Bolts
 - (b) High Mast Standards of 24.5 m (80 ft) and Over
 - 1. High Mast Poles
 - 2. Welding
 - 3. Handholes
 - 4. Luminaire Ring Assembly
 - 5. Head Frame Assembly
 - 6. Winch Assembly
 - 7. External Drive System
 - 8. Cable Terminator
 - 9. Lightning Rod Assembly and Grounding System
 - 10. Anchor Bolts
 - (c) Wire and Cable
 - 1. Polyethylene Conduit
 - 2. Conductors in Cable-Duct
 - 3. Lighting Standard Circuit Wiring
 - 4. Sign and Underpass Wiring
 - 5. Aerial Cable
 - 6. High Mast Tower Luminaire Ring Conductors
 - 7. Power Cable-High Mast Poles

- 8. Electrical Connectors
- (d) Luminaires
 - 1. General Requirements
 - 2. Roadway Lighting Luminaires
 - 3. Sign Luminaires
 - 4. Underpass Luminaires
 - 5. High Mast Luminaires
- (e) Circuit Breakers and Enclosure
 - 1. Circuit Breakers for Type II Service Point
 - 2. Circuit Breakers for Sign and Underpass Circuits
 - 3. Circuit Breakers for High Mast Poles
 - 4. E-Series Magnetic Circuit Breakers
- (f) Multiple Relay Switches with Photocell Receptacles
- (g) Shop Drawings
- (h) Materials Certification
- 913.12 Construction Warning Lights
 - (a) Types of Warning Lights
 - 1. Type A
 - 2. Type B
 - 3. Type C
 - (b) General Requirements
 - (c) Flash Requirements
 - 1. Flash Rate
 - 2. On-Time
 - a. Definition
 - b. Type A
 - c. Type B
 - (d) Optical Requirements
 - 1. Effective Intensity
 - 2. Lens Illumination
 - 3. Reflex-Reflective Performance
 - 4. Testing Procedure
 - (e) Lens Requirements
 - 1. Size of Lens
 - 2. Number of Lenses
 - 3. Lens Chromaticity
 - 4. Lens Luminous Transmittance
 - 5. Lens Material
 - (f) Head and Housing
 - 1. Swivel Head
 - 2. Housing
 - 3. Weatherproofing
 - (g) Photoelectric Controls
 - (h) Basis For Use
- 913.13 Flashing Arrow Sign
- 913.14 Pavement Marking Material
 - (a) Traffic Paint
 - (b) Durable Marking Material
 - 1. Thermoplastic
 - a. Material Requirements
 - (1) Reflectorization
 - (2) Set Time
 - (3) Water Absorption
 - (4) Softening Point
 - (5) Specific Gravity
 - (6) Impact Resistance

- (7) Low Temperature Stress Resistance
- (8) Bond Strength
- (9) Hardness
- b. Packaging
- c. Basis for Use
- 2. Preformed Plastic
 - a. Material Requirements
 - (1) Tensile Strength
 - (2) Adhesive Stability Test
 - (3) Adhesive Shear Strength
 - (4) Bend Test
 - b. Packaging
 - c. Basis For Use
- 3. 100 Percent Solids Epoxy
 - a. Material Requirements
 - (1) Glass Beads
 - (2) Abrasion Resistance
 - (3) Hardness
 - (4) Tensile Strength
 - (5) Compressive Strength
 - (6) Weather Resistance
 - (7) Laboratory Drying Time
 - (8) Viscosity
 - b. Materials Preparation
 - c. Packaging and Storage
 - d. Basis For Use
- (c) Temporary Pavement Marking Tape
- (d) Raised Pavement Marker
 - 1. Snowplowable Raised Pavement Marker
 - a. Prismatic Reflector
 - (1) Optical Performance
 - (2) Seal Test
 - (3) Heat Resistance Test
 - (4) Strength Test
 - (5) Impact Test
 - (6) Temperature Cycling Test
 - (7) Adhesive Tensile Strength Test
 - (8) Basis for Use
 - b. Cast Metal Base
 - (1) Epoxy Adhesive
 - (2) Basis for Use
 - c. Precast Cement Concrete Base
 - (1) Adhesive for Precast Concrete Base
 - (2) Packaging
 - (3) Basis for Use
 - 2. Temporary Raised Pavement Marker
 - a. Optical Requirements
 - b. Strength Requirements
 - c. Adhesive
 - d. Acceptance Evaluation
 - e. Basis for Use
- 913.15 Traffic Signal Materials and Equipment
 - (a) Traffic Signal Controller and Cabinet
 - 1. Model Approval
 - 2. Controllers or Control Units Furnished and Installed by the Contractor
 - 3. Blank

- 4. Bench Testing
- 5. Pretimed Solid State Digital Controller
 - a. General
 - b. Controller Requirements
 - c. Spare Modules
 - d. Controller Enclosure
 - e. Power Requirements
 - f. Certification of Traffic Control Units
 - g. Warranty
- 6. Traffic Actuated Solid State Digital Controller
 - a. General
 - b. Controller Requirements
 - c. Spare Modules
 - d. Controller Enclosure
 - e. Power Requirements
 - f. Certification of Traffic Control Units
 - (1) Certification of a Production Run Model
 - (2) Certification of Environmental Testing
 - g. Warranty
- 7. Cabinet Requirements for Traffic Signal Controllers
 - a. General
 - b. G Cabinet
 - (1) Cast Aluminum Pedestal Base
 - (2) Pedestal Pole
 - (3) Pole Cap
 - c. M Cabinet
 - d. P-1 Cabinet
- 8. Two Circuit Alternating Flasher
 - a. General
 - b. Cabinet Requirements
- (b) Interconnection Equipment.
 - 1. Hardwire Interconnection
 - a. Electro-Mechanical Dial Coordination Unit
 - (1) General
 - (2) Additional Requirements for Master Locations
 - (3) Additional Requirements for Secondary Locations
- (c) Blank
- (d) Signal Head Components
 - 1. Vehicle Signal Face
 - a. General
 - b. Housing, Door, and Visor
 - c. Lens
 - d. Reflector Assembly
 - e. Lamp Receptacle and Wiring
 - f. Section Coupling
 - g. Terminal Block
 - h. Material Requirements
 - (1) Polycarbonate Signal Head
 - (2) Die-Cast Aluminum Signal Head
 - i. Certification
 - 2. Pedestrian Signal Head
 - a. Housing, Door, and Visor
 - b. Optical Unit
 - c. Lens
 - d. Message
 - e. Reflector Assembly

- f. Light Distribution
- g. Electrical
- 3. Disconnect Hanger Junction Box
- 4. Signal Bulbs
- 5. Free Swinging Signal Support Assemblies
- 6. Mid-Mast Arm Mount Signal Bracket
- 7. Pedestal Mounted Control Cabinets or Pedestrian Signal Heads
- (e) Signal Support
 - 1. Steel Strain Pole
 - a. Maximum Load 35.6 kN (8000 lbs)
 - 2. Wood Strain Pole
 - 3. Signal Cantilever Structures
 - a. General
 - b. Signal Support
 - c. Combination Signal-Luminaire Support
 - d. Pole Requirements
 - (1) General
 - (2) Deflection
 - (3) Materials
 - (4) Hardware
 - (5) Anchor Base
 - e. Arm Requirements
 - (1) Signal Cantilever Arm
 - (2) Luminaire Mast Arm for Combination Support
 - (3) Materials
 - f. Anchor Bolts
 - g. Finish
 - h. Certification
 - i. Shop Drawings
 - 4. Downguys, Anchors, Rods, and Guards
- (f) Messenger Cable
 - 1. Messenger Cable
 - 2. Span, Catenary, and Downguy Cable
 - 3. Tether and Support Cable
 - 4. Cable Hardware
 - a. Messenger Hangers
 - b. Cable Ring
 - c. Clamps
 - d. Servi-Sleeves
 - e. Straight Eye-Bolts
 - f. Hub-Eyes
 - 5. Signal Cable
 - a. Hook-up Wire
 - b. Signal Control Cable
 - c. Integral Messenger Interconnect Cable
 - d. 6 Pair/19 Telemetry Cable
 - e. Fiber Optic Interconnect Cable
 - f. Service Cable
 - g. Detection Wire and Sealant
 - (1) Loop Detector Lead-in Cable
 - (2) Roadway Loop Wire
 - (3) Sealant
 - h. Ground Wire
 - i. Splicing Kit
- (g) Ground Rod and Connections
- (h) Castings for Handholes

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- (i) Entrance Switch
- (j) Conduit and Fittings
 - 1. Steel Conduit
 - 2. Polyvinyl Chloride Conduit
- (k) Detector Housing
- (l) Certification
- 913.16 Fabric for Waterproofing
- 913.17 Packaged, Dry, Combined Materials for Mortar and Concrete
- 913.18 Geotextile for Use Under Riprap
- 913.19 Geotextile for Use with Underdrains
- 913.20 Geotextile for Silt Fence

914 -- ROADSIDE DEVELOPMENT MATERIALS

- 914.01 Special Topsoil for Roadside Development
- 914.02 Blank
- 914.03 Fertilizer
- 914.04 Grass and Legume Seed
- 914.05 Mulch
 - (a) Mulch for Seeding
 - 1. Excelsior Mulch
 - 2. Wood Cellulose Fiber
 - 3. Excelsior Blanket
 - 4. Paper Mat
 - 5. Straw Mat
 - (b) Mulch for Plants
- 914.06 Leguminous Inoculants
- 914.07 Sod
- 914.08 Plant Materials
 - (a) Quality of Plant Materials
 - (b) Plant Names
 - (c) Substitutions
 - (d) Grading Standards
 - (e) Nursery Inspection and Plant Quarantine
 - (f) Balled and Burlapped Plants
 - (g) Container Grown Plants
 - (h) Bare Rooted Plants
 - (i) Collected Plants
 - (j) Forms, Shapes, and Condition of Plants
 - (k) Inspection
 - (1) Shipment
 - (m) Certification
- 914.09 Miscellaneous Material
 - (a) Water
 - (b) Stakes for Bracing and Anchoring
 - (c) Tree Wound Dressing
 - (d) Porous Material
 - (e) Pipe
 - (f) Staples
 - (g) Plastic Net

915 -- BRIDGE PILES AND BEARINGS

- 915.01 Steel Shell Encased Concrete Piles and Epoxy Coated Steel Shell Encased Reinforced Concrete Piles
 - (a) General Requirements
 - (b) Fluted Steel Pile Shells
 - (c) Rounded Steel Pipe Shells
 - (d) Epoxy Coating for Piles
 - 1. Prequalification of Organic Coatings for Steel Piles

Section Title

- a. Product Data Sheet
- b. Fingerprint
- c. Materials Safety Data Sheets
- d. Laboratory Report
 - (1) Tensile Strength and Elongation
 - (2) Impact Resistance
 - (3) Abrasion Resistance
 - (4) Salt Fog
- 2. Application
 - a. Surface Preparation
 - b. Coating Application
 - (1) Thickness
 - (2) Cure
 - (3) Continuity of Coating
- 3. Certification
- 915.02 Steel H Piles and Epoxy Coated Steel H Piles
- 915.03 Wood Piles
- 915.04 Elastomeric Bearings
 - (a) Description
 - (b) Materials
 - (c) Manufacturing Requirements
 - (d) Appearance and Dimensions
 - (e) Quality Assurance
 - (f) Certification

916 -- MATERIALS CERTIFICATIONS

- 916.01 General
- 916.02 Types of Certifications
 - (a) Type A
 - (b) Type B
 - (d) Type D
 - (e) Other Types
 - (f) Requirements for Small Quantities of Materials
 - (g) Buy American Requirement
- 916.03 Sample Forms
 - (a) For Plants
 - (b) For Certificate of Nursery Inspection
 - (c) For Welding Electrodes
 - (d) For Buy American Requirement
 - (e) For Fly Ash Source Certification
 - (f) For Portland Cements and Blended Cements
 - (g) For Geotextiles Used Under Riprap
 - (h) For Geotextiles Used With Underdrains
 - (i) Blank
 - (j) Sample Type A Certification Form
 - (k) Sample Type B Certification Form
 - (1) Sample Type C Certification Form
 - (m) Sample Type D Certification Form
 - (n) For Ground Granulated Blast Furnace Slag
 - (o) For Microsilica
 - (p) Sample Asbestos Exclusion Letter

917 -- QUALITY ASSURANCE AGGREGATE CERTIFICATION

- 917.01 General Requirements
- 917.02 Quality Control Plan
- 917.03 Source Approval Requirements
 - (a) Step 1

- (b) Step 2 (c) Step 3 917.04 Removal from Certified Producer Status 917.05 Appeals